

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

POWER INTEGRATIONS, INC., a
Delaware corporation,

Plaintiff,

v.

FAIRCHILD SEMICONDUCTOR
INTERNATIONAL, INC., a Delaware
corporation, FAIRCHILD
SEMICONDUCTOR CORPORATION, a
Delaware corporation, and SYSTEM
GENERAL CORPORATION, a Taiwanese
corporation,

Defendants.

C.A. No. 08-309 JJF-LPS

DECLARATION OF ROBERT BLAUSCHILD

I, Robert Blauschild, declare as follows:

1. I have been asked to give expert opinions and testimony regarding Power Integrations, Inc.'s ("Power Integrations") U.S. Patent Nos. 6,249,876 ("the '876 patent"), 6,107,851 ("the '851 patent"), and 7,110,270 ("the '270 patent"), and System General Corporation's ("SG") U.S. Patents Nos. 7,259,972 ("the '972 patent"), 7,352,595 ("the '595 patent"), and 7,061,780 ("the '780 patent").
2. I have reviewed the above patents, both in the context of this litigation and – as to the '876 and '851 patents – as an expert witness in prior litigation. In these engagements, I have had the opportunity to consider the patents, the file histories of the patents, the prior art cited and considered during prosecution, and additional prior art raised during the various litigations. I have also previously prepared declarations, a technology tutorial,

and expert reports discussing the definitions of the claim terms for the '876 and '851 patents, as well as describing the underlying technology and the understanding of the claim terms to one of ordinary skill in the art.

3. As I have previously testified, a person of ordinary skill in the art related to the patents-in-suit (both Power Integrations' and SG's) would have either a BSEE or MSEE degree in electrical engineering, and would also have 3-7 years experience designing analog electronic circuitry in general. Such a person would also be familiar with the basic textbook topologies of switching power supplies, as well as common electrical components used in such products such as, for example, oscillators, counters, error amplifiers, control loop circuits, and digital-to-analog converters.
4. The SG patents-in-suit relate to DC output power supplies, and purport to describe and claim switching control circuits for such power supplies. The '780 patent describes a specific methodology to implement what is known as "primary-side" control, wherein the output of a switching power supply is regulated based solely on measurements of conditions on the primary, or input, side of the power supply. The '972 patent has a specification similar to that of the '780 patent and also describes and claims "frequency hopping" circuits and methods for reducing EMI in power supplies. Finally, the '595 patent discloses an additional circuit for use in the disclosed SG architecture to perform a "cable compensation" function to account for output voltage changes in the case where the output is connected to a load through a cable.
5. As explained in more detail in prior technology tutorials, in general, a "switching" power supply functions by switching a power transistor on and off to generate pulses of energy in a transformer. When the switch is "on", current flows through the transformer primary

winding and a magnetic field builds up. When the switch is turned off, current on the primary side stops flowing, the magnetic field that was built up in the transformer core discharges, and current is induced to flow in the output winding of the transformer and to the output of the power supply. It is common to control the amount of energy delivered to the output, and thus to regulate the output, by adjusting the amount of time the switch is on during each on/off cycle. This amount of time is typically controlled in response to some feedback circuit that contains information about the output.

6. The circuits disclosed in the '780 patent for regulating the output voltage do so by measuring a "reflected voltage" on the primary side of the power supply, present on something referred to as an "auxiliary" winding. [1:49-51.] A reflected voltage is induced on the primary side of the transformer when the switching transistor is off and the transformer is discharging. An example of a reflected voltage (" V_{AUX} ") is shown in the waveforms of Figure 2 of the '780 patent. [Fig 2.]
7. The disclosed circuit of the '780 patent "multi-samples" a fraction of the reflected voltage (V_{DET}) during the time in which the switching transistor is off to generate a feedback signal and a discharge time signal. The disclosure of the '780 patent makes clear that at least two samples are taken of the voltage during each off-time. [8:8-25; 8:44-48.] This multi-sampling begins after a fixed delay and continues until a sample is detected whose value indicates that the transformer has completely discharged. [8:44-50; 8:56-59; 8:63-67.] The voltage value of this sample is ignored, though the *timing* of this sample is used to determine the discharge time of the transformer. The voltage sample taken before the end of the discharge time – the "end voltage" – is used to determine the feedback signal. [Fig. 4; 7:59-60; 8:51-67.]

8. “Multi-sampling” as used in the ’780 patent claims must mean, as it indicates, that more than one sample is taken during each off time. That is how all of the disclosed embodiments function. Further, the disclosed system could not perform the function of generating a discharge time signal without multiple samples because the end of the discharge time is determined by comparing V_{DET} with a level determined by the penultimate sample. [Fig. 4; 7:58-60; 8:19-25; 8:38-40; 8:51-56.] If only one voltage sample were taken per off-time, the disclosed circuit could not determine when the transformer was fully discharged.
9. Claim 12 of the ’780 patent provides further support for the requirement that “multi-sample” means taking more than one sample per off-time. This claim recites “said switching signal having a minimum on-time once said switching signal is enabled, which further ensures a minimum value of said discharge time for multi-sampling said voltage signal.” Because the length of each on-time can only determine the length of the discharge-time that immediately follows it during that switching cycle, the requirement to have a minimum on-time to ensure a minimum value of the discharge time for multi-sampling makes no sense at all if the multi-sampling is not occurring in that single discharge time. A person of ordinary skill in the art would understand that recitation of claim 12 to further support the conclusion that “multi-sampling” in the claims of the ’780 patent refers to taking multiple samples in a single discharge time, as shown, for example, in Figure 2 of the ’780 patent.
10. In a switching power supply like the ones disclosed in the ’780 and ’972 patents, the primary-side current is zero when the transformer is discharging. This is because the switch on the primary side, which allows primary-side current to flow, is not conducting

when the transformer is discharging. Current can only be sensed on the primary side while the transformer is charging, and not when it is discharging. Fig 2 of the '972 patent – showing I_P (the primary current) being zero when V_{PWM} (the switching signal) is low and when the transformer is discharging (indicated by T_{DS} associated with the reflected voltage V_{AUX}) – shows this relationship. Accordingly, a suggestion that the language of the claims be interpreted to mean that the primary current is sampled during the discharge time of the transformer is incorrect.

11. The switching power supplies shown in the patents-in-suit include voltage regulators. A voltage regulator is meant to provide an output voltage at a desired level to a load, irrespective of changes in input voltage or output load level. In a voltage regulator, the level of the regulator output voltage is set by a feedback loop and an internal reference voltage inside the voltage regulator. If a cable is used to provide power from the voltage regulator to a load, the voltage at the load can be different from the voltage at the regulator output. This is because load current flowing through resistance in the cable causes the voltage at the end of the cable to drop. As a result, the greater the load current flowing through the cable, the greater the voltage drop at the end of the cable.
12. The '595 patent proposes circuitry to compensate for this cable drop: as the voltage drop across the cable increases, the circuitry senses this increase and increases the output voltage of the regulator to compensate. In the '595 patent, measured load current is used to detect the voltage drop across the cable, and to adjust the regulator output voltage accordingly. This is done by using a signal representative of load current (V_I) to increase the reference voltage (V_{REF}) inside the regulator, which in turn increases the regulator output voltage.

13. The '595 circuit uses an error amplifier to measure the regulator output voltage against the internal reference voltage level. An error amplifier used in a feedback control loop like the one disclosed in the patent is an analog circuit. The cable compensation circuit in the patent uses op-amps (operational amplifiers) to generate and to vary the reference signal level used in the voltage loop error amplifier.
14. A person of ordinary skill in the art would understand that the error amplifier and op-amps are analog components that process analog signals. Error amplifiers and op-amps are high-gain amplifiers that operate with small differences in the analog signals applied to their input terminals. The '595 patent's use of an error amplifier and op-amps thus demonstrates that the signals are analog, and the regulator output voltage and the reference voltage level it is measured against are both such analog signals. The '595 patent also discloses adjustment of the level of cable compensation using an external resistor. Using a resistor to vary a signal implies that the signal is analog in nature.
15. None of the disclosed embodiments of the '595 patent would work if V_I and V_{REF} were not analog signals or signals that vary in proportion to one another. If the signals in question were digital (having only two states, On or Off), the error amplifier (71) could not perform its voltage-loop feedback function to regulate the output voltage or adjust the regulated voltage to compensate for different cable lengths. A person of ordinary skill in the art would interpret claim 17 in light of the specification to require the reference and second signals to be analog signals or signals that vary in proportion to one another.
16. Power Integrations' '876 patent includes a digital-to-analog converter as one component of its disclosed frequency jitter circuit. A digital-to-analog converter (or "DAC") is a

well-known structure, and anyone of skill in the art of circuit design would recognize that a DAC is a device that converts a digital input into an analog output.

17. I have reviewed Fairchild's suggestion that the DAC in the '876 patent must be "a device that converts a digital input signal to an essentially proportional analog signal," and I disagree with that assertion. Nothing in the claim language suggests that this is necessarily the case, and the specification and other claims in the '876 patent expressly suggest that the current sources in the DAC may be "binary weighted" or of other possible configurations. [See '876 patent at 2:18-25 and Claims 14-15.] This intrinsic evidence would be understood by a person of ordinary skill in the art to mean that the output of the DAC can vary in different ways, not just the specific manner shown in the preferred embodiment.

18. Figure 1 of the '876 patent shows the structure for a preferred embodiment of the '876 invention. Block 110 is the oscillator (labeled "OSC") that operates by charging and discharging a fixed capacitor (134). Block 150 is a digital-to-analog ("D/A") converter that produces an output current that varies based upon the digital input signals (155, 157, 163, and 167). The digital input signals control switches 154, 158, 162, and 166, which are connected to current sources 152, 156, 160, and 164. As the digital input signal changes and the outputs of more of the current sources are added to the fixed current at the control input 123, the oscillator charge and discharge current increases. The result is that the voltage of capacitor 134 ramps up and down between its fixed thresholds at a faster rate, increasing the frequency of the oscillator, and thus the frequency of operation of a switching voltage regulator using that oscillator. By changing the digital input signals on a periodic basis, the frequency varies, and the EMI generated by the regulator

is spread out, reducing EMI. Figure 2 of the '876 patent shows how the output frequency varies as the specific digital input signal shown in Figure 1 varies.

19. Claim 21 recites "[o]ne or more current sources coupled to the control input," but there is no limitation that requires the output of the current sources to be supplied directly as a current, rather than, for example, being converted to a voltage before being applied to the control input. A person of ordinary skill in the art would have understood the latter to be a common configuration.
20. In addition to current sources connected to a current-controlled oscillator ("CCO"), the '876 patent also discloses a voltage control input for providing a variable voltage to a voltage-controlled oscillator ("VCO"). [See, e.g., '876 Patent at Fig. 4; 2:43-49; 4:63-66; 6:42-67; and Claim 17.] In this alternative, the frequency may be varied by adjusting the threshold voltage at which the oscillator changes from charge to discharge (or vice-versa) while keeping the charge current and the capacitance fixed.
21. In view of these various disclosures, a person of ordinary skill in the art would read the '876 patent to teach that one could change the oscillator frequency at least by changing either of the voltage threshold or the charge current while keeping the other constant.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 5th day of August, 2009, at LOS ALTOS, CA.



Robert Blauschild